GHBullard & Associates LLP
Civil and Traffic Engineering Consultants

Existing Access Road At Viking Way, Bar Hill, Cambridgeshire

for

Bar Hill Parish Council

TECHNICAL NOTE

Highway Surfacing Remediation Report

Date:

September 2023

GHB Reference:

059/2023/TEC

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Status: For Information

Prepared By:

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1. EXECUTIVE SUMMARY

1.1. This report has been prepared by G.H. Bullard and Associates LLP, founded in 1987 and specialising in the fields of Civil, Highway and Drainage Engineering. The Practice has advised and represented Local Authorities, Private Companies and Individuals on numerous Planning and Civil Engineering matters.

1.2.

Report Prepared by:	Dan Henning
Client:	Bar Hill Parish Council
Report Instructed by:	Lyndsey Copeman

1.3. Remediation options for the existing surfacing defects in Viking Way have been considered. Without an intrusive investigation, it is not possible to give a guaranteed solution to the problem. However, G H Bullard and Associates LLP have drawn upon personal experience and consulted with colleagues and experts and proposed two possible solutions to the problems identified by the Client and visible from the site survey.

1.4. Both options are worthy of consideration by the Client. Option 1 is a full reconstruction of the roadway, completed to Cambridgeshire County Council Housing Estate Road Specification (HERCS), which would give the likely longest design life. For Option 2, the existing road would be planed and surface dressed with 40mm of asphalt, which is the lowest cost option but offers a likely reduced design life. Outline design specifications for both identified solutions have been proposed.

1.5. The overall cost of Option 1 is estimated at £93,155.00 and estimated at £30,435.00 for Option 2. All rates are an estimation based on current prices and dependent upon the availability of this material at the time of installation. It would be sensible to factor in a contingency in these sums.

Disclaimer:

The information provided within this report is based on the available data currently recorded or provided by a third party. The accuracy of this report is therefore not guaranteed beyond the issue date of the report. Any re-submissions, re-assignments or detailed design should consider the need to make additional appropriate searches, inspections, surveys and enquiries. GH Bullard & Associates LLP are highway and drainage consultants and not quantity surveyors, therefore the costs are relative only and will vary with fluctuations in materials and other costs.

2. INTRODUCTION

2.1. G.H. Bullard & Associates LLP have been instructed by Ms Lyndsey Copeman (Parish Clerk) on behalf of Bar Hill Parish Council to prepare a report on the options for remediating the existing surfacing problems in Viking Way.

2.2. A visual site walkover survey was undertaken to assess the extents of the problems. The existing road construction layer thicknesses and materials are unknown as there has been no physical intrusive site investigation. This limits options which can be considered for remediation to surfacing solutions unless intrusive testing is subsequently undertaken.

2.3. Viking Way is an industrial estate road which lies within the village of Bar Hill in Cambridgeshire:

2.3.1. Postcode: CB23 8EL

2.3.2. National Grid Reference: 537676, 263786.

2.4. The site location plan is shown below. The area addressed by this report is shown shaded in red and covers approximately 885m².

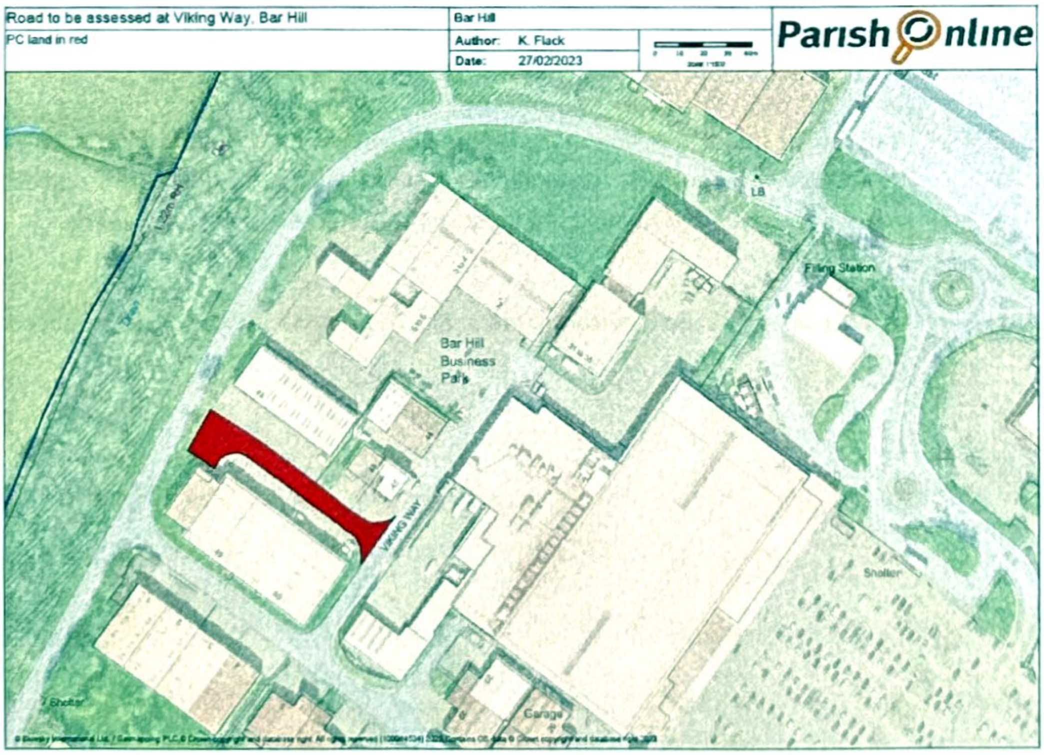


Figure 2.3- Extent of works including access

3. SITE VISIT WALK OVER

3.1. The site visit to Viking Way was undertaken on Monday 19th June 2023 to undertake a visual walkover survey of the road. In addition to the author of this report, in attendance was Charlie Parish of BB Surveys, undertaking the topographical survey, and Ray Wicks of Ray Wicks Consultant Services Ltd, an asphalt surfacing consultant. Viking Way is an unadopted public highway owned by Bar Hill Parish Council with commercial units on both sides of the road. The section of road covered in this report is approximately 89m long and varies in width between 6.7m on the access road to 19.1m at the turning head at the Western extent.

3.2. Upon arrival on site, it was clear that the considered section of Viking Way had not had surface treatment works completed for a substantial time. Within the considered section, there was evidence of cracking in the surfacing, patch repairs and substantial pot holing. It is clear that the current surfacing has reached the end of its service life. This road requires treatment before the road deteriorates further to the point of failure, and possibly results in private vehicles being damaged during use of the road.

3.3. During the site walkover it was noted that the road access junction had been subject to surfacing remedial works more recently that the rest of the access road. However, cracking was identified in the resurfaced access, indicating that the road's structural integrity may be compromised. It is therefore suggested that this section should be subject to the same remedial works as the rest of the access road as described in the following sections.

3.4. It should be noted that, due to the nature of the businesses accessed off Viking Way, there will be an increased density of heavy vehicles trafficking and manoeuvring on the surface. This will be a factor when determining the most suitable method of remedial works.

3.5. Local businesses should be contacted and consulted in regards to the proposed works.

4. ALTERNATIVE TECHNIQUES FOR PRODUCING AN IMPROVED SURFACE

4.1. The alternative approaches to a solution of the current problems, considering preference for an aesthetically pleasing new road surface, have been considered together with the risks, advantages, disadvantages, and orders of cost associated with each, below.

4.2. Option 1: Full Reconstruction

4.2.1. Description

4.2.1.1. The full depth of the existing road construction is to be removed down to the original sub grade and excavated further if necessary to meet the construction depth specified in Section 4.7. The road is to be replaced with a Cambridgeshire County Council (CCC) specification road construction for the full $885m^2$ area highlighted.

4.2.1.2. The reconstruction of the access should be tied into the existing road in accordance with CCC specification for stepped road tie-in construction. Refer to **Appendix A**.

4.2.2. Risks

4.2.2.1. If sufficient surface gradients are not restored during the re-construction of the road, the likelihood of surface water drainage ponding increases, which could lead to future surface failure and potholing.

4.2.2.2. If the existing road has sub-standard layer thicknesses, this will create an issue when tying into the existing construction when installing the reconstruction works. This could involve extra excavation.

4.2.2.3. Greater health and safety risks will be associated with the full reconstruction of the road as opposed to the other options. This includes, but is not limited to, the quantity of extra materials, and associated vehicle movements, required, and the risk of utility clashes with the full road construction.

4.2.2.4. Furthermore, utilities, including drainage, are more likely to be encountered at this increased excavation depth under the existing road. These would have to be located and assessed prior to any reconstruction works taking place.

4.2.3. Advantages

4.2.3.1. The system would likely add 20 to 40 years to the life expectancy of the road. This could be further verified by measuring the current vehicular usage and relating this to the wear rate expected to affect service life.

4.2.3.2. Any and all structural deficiencies in the existing road would be addressed in the reconstruction and eliminated.

4.2.3.3. Future maintenance requirements would be reduced and not required for a significantly longer period.

4.2.4. Disadvantages

4.2.4.1. The cost of this option would be a much larger up-front cost when compared to the other options.

4.2.4.2. This option would incur a significantly greater impact on the local businesses served off Viking Way during the reconstruction process.

4.2.4.3. The existing drainage system present in the existing road (such as gullies and pipes) may have to be diverted or replaced as part of the reconstruction works, depending on their location and depths. Costs for this are excluded

4.2.4.4. Any utilities present in the existing road may have to be diverted as part of the reconstruction works, depending on the locations and depths, to accommodate present day expectations. Costs for this are excluded.

4.2.5. Principal Specification Requirements

4.2.5.1. 375mm thick (depth to be confirmed by on site CBR testing) non-frost-susceptible Type 1 granular material to SHW Clause 803 in accordance with HERCS Appendix 2.

4.2.5.2. 125mm thick AC32 dense base 40/60 to BS-EN 13108-1 and PD6691 in accordance with HERCS Appendix 2.

4.2.5.3. 65mm thick AC20 dense binder 40/60 to BS-EN 13108-1 and PD6691 in accordance with HERCS Appendix 2.

4.2.5.4. 40mm thick SMA 6mm surface to BS-EN 13108-5 with 40-60 pen binder and PSV=50, in accordance with HERCS Appendix 2.

4.2.5.5. Use CCC specification for stepped construction of tie-in in accordance with HERCS Appendix 11. Refer to **Appendix A**.

4.2.6. Order of Likely Costs

4.2.6.1. The Type 1 granular material sub-base would be expected to cost in the order of £35.00 per square metre.

4.2.6.2. The AC32 base course would be expected to cost in the order of £31.00 per square metre.

4.2.6.3. The AC20 binder course would be expected to cost in the order of £19.00 per square metre.

4.2.6.4. The SMA surface course would be expected to cost in the order of £18.00 per square metre.

4.2.6.5. In addition to the unit rates a mobilisation and site establishment cost of £2,000.00 for the surface dressing should be allowed for in determining a budget figure.

4.2.6.6. The project cost would be estimated to be in the order of **£93,155.00**.

4.2.6.7. All rates are an estimation based on current prices and dependent upon the availability of this material at the time of installation. It would be sensible to factor in a contingency in this sum.

4.3. Option 2: Plane and Resurface

4.3.1. Description

4.3.1.1. The existing surface would be cleaned and swept. The surface would then be planed out to a depth of 40mm below the existing surface.

4.3.1.2. Any pothole that extends deeper than the 40mm planing will have to be filled with an appropriate regulating material (based on the depth of the pothole), compacted, given time to cure before continuing.

4.3.1.3. The planed surface should be swept and sprayed with a bitumen emulsion bonding tack coat to seal the surface.

4.3.1.4. A Tensar composite asphalt interlayer should be laid over the planed area with a bitumen overlay to bind to the subsequent asphalt (SMA) surfacing material.

4.3.1.5. The SMA surfacing should be laid and compacted, ensuring that the appropriate longitudinal fall and crossfall gradients are maintained.

4.3.1.6. The resurfacing of the access will be tied into the existing road in accordance with a surfacing tie-in specification for stepped construction. Refer to **Appendix A**.

4.3.2. Risks

4.3.2.1. If potholes are missed prior to the laying of the proposed surface course, this could lead to low points and the re-occurrence of the surface failure and future potholes.

4.3.2.2. For the surfacing to function efficiently it would be necessary to have a sufficient depth of competent construction to allow the new surfacing to be compacted by a suitably sized roller/ compaction equipment to produce the required low air voids content. The possibility of settlement or other 'failure' mechanism within the normal life of the surfacing cannot be ruled out.

4.3.2.3. Insufficient construction thickness within the existing access road may result in tie-in and surfacing issues. Planing of surface could lead to delamination or failure of the underlying structure resulting in the potential requirement for areas of full depth construction.

4.3.3. Advantages

4.3.3.1. The system would be relatively low cost in comparison to Option 1.

4.3.3.2. The system would be of similarly pleasing aesthetic appearance to the existing access and Option 1 proposed.

4.3.3.3. Drainage levels would not require adjusting if a constant plane and relay approach is taken.

4.3.3.4. Utilising the above composite reinforcement grid technology is proven to increase the life of the pavement structure, by 3 to 4 times, dependant on existing condition and failure modes. The system would likely add an estimated 10+ years to the life expectancy of the road.

4.3.3.5. Less disruption will be incurred to the local businesses compared to Option 1.

4.3.4. Disadvantages

4.3.4.1. There would be no structural improvement to the whole depth of pavement, when only resurfacing is applied. Any structural defects will be retained.

4.3.4.2. A degree of uncertainty is intrinsic in the system as it is unknown of the existing road structure is unknown. Cores prior to installation could further advise this approach.

4.3.4.3. Potential for future reflective cracking due to potential underlaying structural issues throughout Viking Way.

4.3.5. Order of Likely Costs

4.3.6. Principal Specification Requirements

4.3.6.1. Plane out existing surfacing to a nominal depth of 40 mm, dispose of planings off-site, sweep and clean the planed surface to receive the new surfacing course.

4.3.6.2. 160/220 pen bitumen bonding system at a minimum residual spread rate of 1.1kgs/m2 or higher depending on the manufacturers recommendations.

4.3.6.3. Install Tensar 'Glasstex' P100 composite asphalt interlayer reinforcement.

4.3.6.4. 40mm thick SMA 6mm surface to BS-EN 13108-5 with 40-60 pen binder and minimum PSV=50, laid in accordance with Clause 12.03 of CCC HERCS.

4.3.6.5. Use specification for stepped construction of tie-in in accordance with **Appendix A**.

4.3.7. Order of Likely Costs

4.3.7.1. The surface course, Tensar composite interface, surface preparation and bitumen coatings would be expected to cost in the order of £31.00 per square metre. This rate is dependent upon the condition of the surface prior to laying.

4.3.7.2. In addition to the unit rates, a mobilisation and site establishment cost of £2,000.00 for the surface dressing should be allowed for in determining a budget figure.

4.3.7.3. Furthermore, an additional contingency sum of £1,000.00 for filling of excessive potholes should be allowed for in determining a budget figure

4.3.7.4. The project cost would be estimated to be in the order of **£30,435.00**.

4.3.7.5. All rates are an estimation based on current prices and dependent upon the availability of this material at the time of installation. It would be sensible to factor in a contingency in this sum.

5. CONCLUSIONS AND RECOMMENDATIONS

5.1. The existing road construction layer thicknesses and materials are unknown since there has been no physical intrusive site investigation. This limits options which can be considered for remediation. Two viable systems have been considered in the preceding paragraphs together with an estimated orders of costs. GH Bullard & Associates LLP are highway and drainage consultants and not quantity surveyors, therefore the costs are relative only and will vary with fluctuations in materials and other costs. It is known that a national increase in the cost of all material is an ongoing situation and it is advised to allow for a sizable contingency when planning for the work to be undertaken.

5.2. Principle specification requirements are given for each option which should enable the Client to discuss the system merits and costs with knowledgeable Contractors. However, should it be required to carry out the work under a formal tender and contract basis using one of the Institution of Civil Engineers forms of contract then more formal and detailed specifications should be drafted.

5.3. The reconstruction approach (Option A) will necessitate surveys prior to the final design and during construction. It would be necessary for a drainage and utilities survey to be carried out to assess the impact these unknowns will have on the construction process. Furthermore, CBR testing of the road formation would be required to enable the depth of sub-base to be finalised.

5.4. The lowest cost system is Option 2 (Plane and Resurface). However, Option 1 may offer a better whole life cost due to the likely increased life expectancy and lower maintenance and monitoring requirements. From the information we have available we have only been able to provide a 'best guess' estimate of the costs of dealing with the proposed works. It would be advisable to obtain more information regarding the structural integrity and existing road make-up before finally committing to the either regime, through both intrusive and non-intrusive investigations being completed.

5.5. If the Plane and Resurface approach (Option 2) is chosen, it should not preclude the full depth reconstruction at a future time when funds might be available.

5.6. All existing road markings should be reinstated on completion of the surfacing.

5.7. Option 2 (Plane and Resurface) would be our preferred option as it provides a proportionate cost effective solution with minimised risk of utility or drainage clashes, albeit with greater future maintenance liability.

5.8. It is recommended that future inspections are undertaken at regular intervals (2-4 years) to assess the ongoing condition of the road under the supervision of a qualified Consultant. This will permit for interim defects to be noted and addressed in advance of these becoming more significant and resulting in more substantial structural issues occurring.

6. ACKNOWLEDGEMENTS

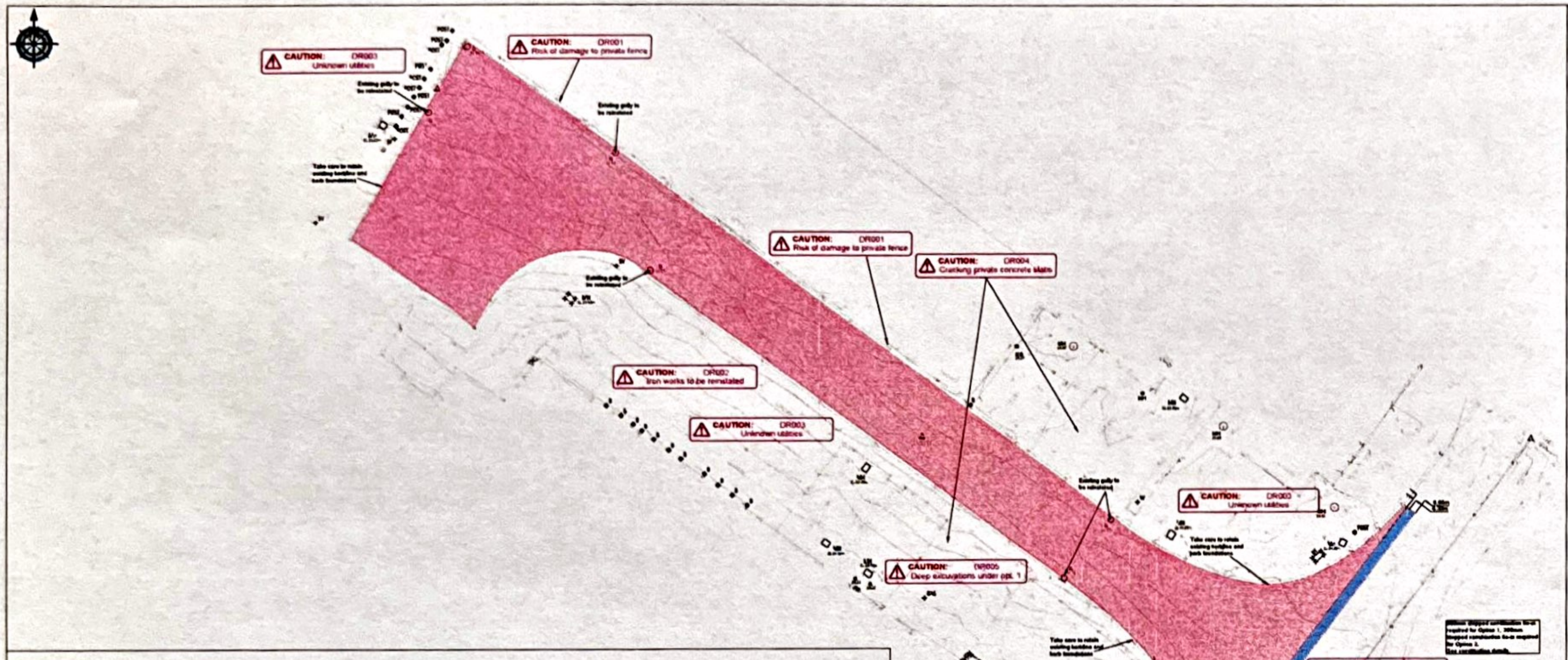
6.1. We are grateful for the help provided in drafting this report by Ray Wicks of Ray Wicks Consultants Services.

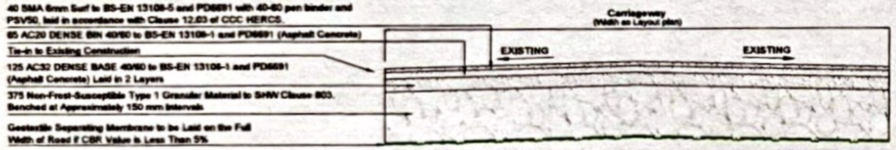
7. LIST OF APPENDICES

Appendix A - Site Plan Layout including Risk Assessment and Tie-In Details

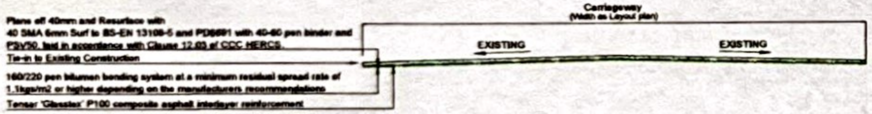
APPENDIX A

Site Plan Layout including Risk Assessment and Tie-In Details

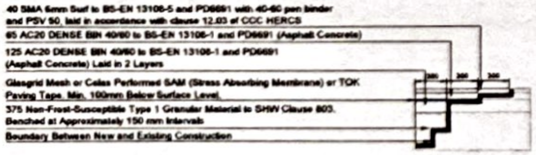

CAUTION: DR003 Unknown utilities
CAUTION: DR001 Risk of damage to private fence
Existing gully to be reinstated
Take care to retain existing kerbline and kerb foundations
CAUTION: DR001 Risk of damage to private fence
CAUTION: DR004 Cracking private concrete slabs
Existing gully to be reinstated
CAUTION: DR002 Iron works to be reinstated
CAUTION: DR003 Unknown utilities
Existing gully to be reinstated
CAUTION: DR003 Unknown utilities
Take care to retain existing kerbline and kerb foundations
CAUTION: DR005 Deep excavations under opt. 1
Take care to retain existing kerbline and kerb foundations
CAUTION: DR003 Unknown utilities
CAUTION: DR006 Partial Lane Closures Required
required for Option 1, 300mm stepped construction tie-in required for Option 2. See construction details.


40 SMA 6mm Surf to BS-EN 13108-5 and PD6691 with 40-60 pen binder and PSV50, laid in accordance with Clause 12.03 of CCC HERCS.
65 AC20 DENSE BIN 40/60 to BS-EN 13108-1 and PD6691 (Asphalt Concrete)
Tie-in to Existing Construction
125 AC32 DENSE BASE 40/60 to BS-EN 13108-1 and PD6691 (Asphalt Concrete) Laid in 2 Layers
375 Non-Frost-Susceptible Type 1 Granular Material to SHW Clause 803. Benched at Approximately 150 mm Intervals
Geotextile Separating Membrane to be Laid on the Full Width of Road if CBR Value is Less Than 5%
Carriageway (Width as Layout plan)
EXISTING
EXISTING

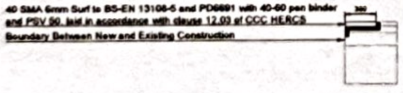
OPTION 1:
TYPICAL CCC ACCESS ROAD CONSTRUCTION DETAIL
(CCC HERCS APRIL 2018- APPENDIX 2)


Plane off 40mm and Resurface with
40 SMA 6mm Surf to BS-EN 13108-5 and PD6691 with 40-60 pen binder and PSV50, laid in accordance with Clause 12.03 of CCC HERCS.
Tie-in to Existing Construction
160/220 pen bitumen bonding system at a minimum residual spread rate of 1.1kgs/m2 or higher depending on the manufacturers recommendations
Tensar 'Glasstex' P100 composite asphalt interlayer reinforcement
Carriageway (Width as Layout plan)
EXISTING
EXISTING

OPTION 2:
TYPICAL CCC RESURFACING CONSTRUCTION DETAIL


40 SMA 6mm Surf to BS-EN 13108-5 and PD6691 with 40-60 pen binder and PSV 50, laid in accordance with clause 12.03 of CCC HERCS
65 AC20 DENSE BIN 40/60 to BS-EN 13108-1 and PD6691 (Asphalt Concrete)
125 AC20 DENSE BIN 40/60 to BS-EN 13108-1 and PD6691 (Asphalt Concrete) Laid in 2 Layers
Glasgrid Mesh or Colas Performed SAM (Stress Absorbing Membrane) or TOK Paving Tape. Min. 100mm Below Surface Level.
375 Non-Frost-Susceptible Type 1 Granular Material to SHW Clause 803. Benched at Approximately 150 mm Intervals
Boundary Between New and Existing Construction
300
300
300

TYPICAL CCC STEPPED CONSTRUCTION DETAIL
(CCC HERCS APRIL 2018- APPENDIX 11)


40 SMA 6mm Surf to BS-EN 13108-5 and PD6691 with 40-60 pen binder and PSV 50, laid in accordance with clause 12.03 of CCC HERCS
Boundary Between New and Existing Construction
300

TYPICAL CCC STEPPED CONSTRUCTION DETAIL
(ONE LAYER)

Station Identifier
Mag Nail & Washer
Mag Nail & Washer
Mag Nail & Washer
Mag Nail & Washer

Legend-

🟥	Extent of works under Option 1 (reconstruction) and Option 2 (resurfacing)
🟦	Extent of stepped construction tie-in required (900mm for Option 1, 300mm for Option 2)

NOTES:

1. This drawing is to be read in conjunction with GHB series 059/2023 drawings and documents and any other relevant project team documents.
2. Preliminary Issue - This drawing is not to be used for construction or detailed pricing purposes. Any work undertaken before approvals are received (in writing) are at risk of abortive works.
3. This drawing has been produced based upon the following information: Topographical Survey by BB Surveys Ltd. (Ref. BBS-CP-EGL-SU-00 dated 06.07.23) subject to transformation of
Scale 1.0 and translation (0, 0) about point (0, 0, 0).
4. The contractor is to take extreme care to locate and avoid any existing services.

Drainage Installation:

5. All main drainage works to be installed in accordance with Sewerage Sector Guidance - Design and Construction Guidance (April 2020) and the requirements of the Anglian Water Engineer/ Inspector
6. All manholes to be installed in accordance with Sewerage Sector Guidance - Design and Construction Guidance (April 2020)
7. Unless specified, all drainage pipework to be:

Vitrified Clay	to	BS-EN 295
Concrete	to	BS 5911
Grey Iron	to	BS 437
Ductile Iron	to	BS-EN 598
UPVC	to	BS-EN 1401
PP	to	BS-EN 1852
Structure walled plastic	to	BS-EN 13476

8. All pipe dimensions to be as shown.
9. Sulphate resistant cement to be used in all concrete and concrete products used in main drainage works.
10. Where cover to pipes is less than 1.2 m in trafficked areas and 0.9 m below other hard landscaped areas only rigid pipes with concrete surround/slab protection should be used.
11. All inspection chambers to be 450 mm diameter. Where total depth exceeds 1.2 m the cover size should be 350 mm x 350 mm (Max.) to restrict access, where total depth is less than 1.2 m use 450 mm x 450 mm covers.
12. Cover strength to be D400 in carriageways, C250 in lightly trafficked (i.e. pedestrian) areas, B125 elsewhere.
13. The contractor is ascertain the precise position, depth & size of all sewer connections before drain laying commences and report all discrepancies to the engineer.
14. The design infiltration rate to be confirmed by representative testing to BRE DG365 prior to construction and all discrepancies reported to the engineer.
15. The contractor is to ensure that all excavations for proposed drainage works are not undermining existing or proposed adjacent foundations.

Carriageway Installation:

16. All roadworks and adoptable storm water drainage to be undertaken in strict accordance with the current S.C.C. Highway Estate Roads Construction Specification and agreed on site by the S.C.C Engineer.
17. Verification of formation subgrade CBR required prior to installation of subbase. Refer to engineer if less than design value of: (# % - SI Ref)
18. Foundation design to DMRB CD 225 (Restricted Class 2)
In-situ testing of subbase is not required at top of granular material to confirm if foundation stiffness achieved.
19. All compaction of granular material to SHW Clause 802 unless stated otherwise.

Rev	Rev. Date	Description	Drawn	Check
P1	01/09/23	Initial Issue	JWT	DSH

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IP31 3PA

Client:
BAR HILL PARISH COUNCIL

Project:
VIKING WAY, BAR HILL

Drawing Title:
APPENDIX A:
PROPOSED REMEDIAL OPTIONS
SITE PLAN LAYOUT INCLUDING RISK
ASSESSMENT & CONSTRUCTION
DETAILS

FOR INFORMATION
PLAN- 1:200, DETAILS- N.T.S @ A1
SEPT 2023 | JWT
059-2023.DWG | DSH
059/2023/001 | P1